

Application of: Tae-Kyung Yoo, et al.

Serial No.: 10/599,232

Amendment and Response

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior revisions, and listings, of claims in the application.

**Listing of Claims:**

1. (Currently amended) A III-nitride compound semiconductor light emitting device including an n-type III-nitride semiconductor layer, an active layer made of III -nitride semiconductor and deposited over the n-type III-nitride semiconductor layer, a p-type III-nitride semiconductor layer deposited over the active layer made of III-nitride semiconductor, and a p-side electrode deposited over the p-type III-nitride semiconductor layer, the light emitting device comprising:
  - a first layer composed of a carbon-containing compound layer, the first layer interposed between the p-type III-nitride semiconductor layer and the p-side electrode, and the first layer being grown on the p-type III-nitride semiconductor layer; [[and]]
  - a second layer composed of a III-nitride semiconductor layer, the second layer grown after including a plurality of island-like protrusions, each of the protrusions being formed on a top surface of the first layer; and is grown the p-side electrode being formed on said second layer.

2. (Canceled)

3. (Original) The III-nitride compound semiconductor light emitting device of claim 1, wherein the first layer is one selected from the group consisting of silicon carbide ( $\text{Si}_a\text{C}_b$  ;  $a,b \neq 0$ ), silicon carbon nitride ( $\text{Si}_c\text{C}_d\text{N}_e$ ;  $c,d,e \neq 0$ ) and carbon nitride ( $\text{C}_f\text{N}_g$ ;  $f,g \neq 0$ ).

Application of: Tae-Kyung Yoo, et al.

Serial No.: 10/599,232

Amendment and Response

4. (Original) The III-nitride compound semiconductor light emitting device of claim 3, wherein the n-type III-nitride semiconductor layer, the active layer made of III-nitride semiconductor, the p-type III-nitride semiconductor layer, and the second layer is composed of  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ), and wherein the second layer is grown in a form of a plurality of islands due to different material characteristics between the first layer and the second layer.

5. (Original) The III-nitride compound semiconductor light emitting device of claim 3, wherein the second layer is a p-type III-nitride semiconductor layer.

6. (Original) The III-nitride compound semiconductor light emitting device of claim 4, wherein the second layer is made of a p-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ).

7. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the first layer is in a thickness of 5 Å to 1000 Å.

8. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the growth temperature of the first layer is 500° C. to 1,100° C.

9. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the first layer is a p-type carbon-containing compound layer.

Application of: Tae-Kyung Yoo, et al.

Serial No.: 10/599,232

Amendment and Response

10. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the first layer is an n-type carbon-containing compound layer.

11. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the first layer is formed as a nonuniform layer.

12. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the first layer is formed as a uniform layer.

13. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the second layer is in a thickness of 100Å to 5000Å.

14. (Currently amended) The III-nitride compound semiconductor light emitting device of claim 6, further comprising:

a third layer made of  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ) and formed on ~~grown after~~ the second layer is grown.

15. (Original) The III-nitride compound semiconductor light emitting device of claim 14, wherein the third layer is in a thickness of 5 Å to 200 Å.

16. (Previously presented) The III-nitride compound semiconductor light emitting device of claim 3, wherein the p-side electrode is made of anyone selected from the group consisting of

Application of: Tae-Kyung Yoo, et al.

Serial No.: 10/599,232

Amendment and Response

nickel, gold, silver, chrome, titanium, platinum, palladium, rhodium, iridium, aluminum, tin, ITO, indium, tantalum, copper, cobalt, iron, ruthenium, zirconium, tungsten, and molybdenum.

17. (Original) The III-nitride compound semiconductor light emitting device of claim 3, wherein the silicon source for growing the first layer is any one selected from the group consisting of SiH<sub>4</sub>, Si<sub>2</sub>H<sub>8</sub>, and DTBSi, the carbon source for growing the first layer is anyone selected from the group consisting of CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, and CBr<sub>4</sub>, and the nitrogen source for growing the first layer is anyone selected from the group consisting of NH<sub>3</sub>, and Hydrazine-based source material.

18. (Currently amended) A III-nitride compound semiconductor light emitting device comprising:

a substrate [[10]];  
a buffer layer [[11]] deposited on the substrate [[10]];  
an n-type Al(x)Ga(y)In(1-x-y)N (0≤x≤l, 0≤y≤l, 0≤x+y≤l) layer [[12]] deposited on the buffer layer [[11]];  
an Al(x)Ga(y)In(1-x-y)N (0≤x≤l, 0≤y≤l, 0≤x+y≤l) active layer [[13]] deposited on the n-type Al(x)Ga(y)In(1-x-y)N (0≤x≤l, 0≤y≤l, 0≤x+y≤l) layer [[12]];  
an p-type Al(x)Ga(y)In(1-x-y)N (0≤x≤l, 0≤y≤l, 0≤x+y≤l) layer [[14]] deposited on the Al(x)Ga(y)In(1-x-y)N (0≤x≤l, 0≤y≤l, 0≤x+y≤l) active layer [[13]];

Application of: Tae-Kyung Yoo, et al.

Serial No.: 10/599,232

Amendment and Response

a first layer [[20]] made of one selected from the group consisting of silicon carbide ( $\text{Si}_a\text{C}_b$ ;  $a,b \neq 0$ ), silicon carbon nitride ( $\text{Si}_c\text{C}_d\text{N}_e$ ;  $c,d,e \neq 0$ ) and carbon nitride ( $\text{C}_f\text{N}_g$ ;  $f,g \neq 0$ ), and grown on the p-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ) layer [[14]];

a second layer [[21]] made of p-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ), composed of a plurality of islands for increasing external quantum efficiency, and formed on ~~grown after~~ the first layer [[20]] ~~is grown~~;

a p-side electrode [[17]] deposited on the second layer; and, an n-side electrode [[18]] deposited on the n-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ) layer [[12]].

19. (Currently amended) The III-nitride compound semiconductor light emitting device of claim 18, wherein the p-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ) layer [[14]] and the second layer [[21]] made of p-type  $\text{Al}(x)\text{Ga}(y)\text{In}(1-x-y)\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq x+y \leq 1$ ) are made of GaN.

20. (Original) The III-nitride compound semiconductor light emitting device of claim 18, wherein the light emitting device is a light emitting diode.